

Microdata User Guide
Survey of Staffing - Candidates
2010 - Cycle 2



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1.0 Introduction

The Survey of Staffing – Candidates (SOS) Cycle 2 was conducted by Statistics Canada from January 26th to February 26th, 2010 on behalf of the Public Service Commission (PSC). This manual has been produced to facilitate the manipulation of the microdata files of the survey results.

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2.0 Background

The Public Service Commission (PSC) conducted the Survey of Appointments (SOA) from 2000 to 2007 as a means of monitoring staffing in the public service. When the new *Public Service Employment Act (PSEA)* came into force on December 31st, 2005, it became apparent that the PSC needed to expand the scope of its survey activity to non-appointees to meet its obligations under the legislation and to provide a richer set of data for analysis of the staffing system under the new *PSEA*.

As a follow-up to the SOA, the PSC asked Statistics Canada to conduct the first cycle of the Survey of Staffing – Candidates (SOS) to a sample of public service employees working in federal departments and agencies with at least 350 employees or more, which fall under the *PSEA*. In the spring of 2007, English and French focus groups that included employees from different departments, at various groups and levels were held across the country. In November and December of 2007, a pilot version of this survey was conducted by Statistics Canada in some departments. The first SOS (Cycle 1) was conducted in January and February 2009.

The content of the questionnaire and the methods of collection for Cycle 1 of the survey were designed and implemented using the information gathered in the focus groups and the pilot survey. The content for Cycle 2 is the same as Cycle 1 with the exception that the survey covers all types of staffing processes instead of being limited to a few specific types.

The survey collects data on the appointment process, staffing strategies, the area of competition and the experiences of public servants who have participated in a staffing process. Since the Public Service Commission is also mandated to oversee the political impartiality of the public service, the survey collected information on political activities.

3.0 Objectives

The major objective of the survey is to collect data on staffing experiences of federal public service employees who participated in specific staffing process types during the reference period and, on political activities for all public service employees.

The information gathered by the survey will contribute to a government-wide perspective on the staffing process and will help to identify areas where improvement is needed to the staffing system. It will also be useful in providing information to determine whether any changes to the *Public Service Employment Act (PSEA)* and/or related policies are needed when the legislation is revisited in 2010. The questions on political activities will provide an indication of the participation by public servants in political activities, the information sources that they typically consulted regarding political activities, and their knowledge of their rights and responsibilities.

4.0 Concepts and Definitions

This chapter outlines concepts and definitions of interest to the users.

The population for the survey included all public service employees working in federal departments and agencies with at least 350 employees or more, which fall under the *Public Service Employment Act (PSEA)*.

A **Staffing Process** is any action or process intended to result in one or more appointments within, or into the federal public service. This could involve a change in group and/or level (e.g., CR-03 to CR-05), and/or a change in work status (e.g., term to indeterminate).

A **In-scope Staffing Process** is any staffing process which **excludes** staffing processes for a deployment, a casual, consulting or acting positions, group and/or level changes resulting from a simultaneous reclassification for a number of employees at once, incumbent-based promotions, promotions arising from the completion of a specific training or development program; and automatic conversions of term positions to indeterminate positions. Staffing processes from which respondents voluntarily withdraw before their conclusion were excluded.

Some definitions were included on the questionnaire to ensure that all respondents had the same understanding of the terms. These include:

Acting Position

A position created by the temporary assignment of an employee to the duties of a higher level, with an adjustment to pay.

Casual

A person hired into the public service on a short term temporary basis. A casual employee cannot work in a single department/agency for more than 90 days within a calendar year.

Ending of the process

A process that has ended for a candidate because the candidate: has received an offer of appointment; is a member of a candidate pool or an inventory of qualified persons awaiting a future position; has been told his candidacy has not been retained; or the process has ended prematurely, before any decision was taken.

Consulting

A position held by a professional who provides advice or services in a particular area of expertise. This person is self-employed or works for a consulting firm.

Deployment

The transfer of an employee without promotion, from one position to another in the same occupational group. Where authorized by the *Public Service Employment Regulations (PSER)*, employees may be transferred to another occupational group.

Development Program

Employees in these programs will usually get a promotion within a set amount of time (e.g., EC-1 to EC-2 after a year, via a series rotations or placements).

Hiring Manager

A person who chairs a board that makes a selection among candidates, a person who selects one or more candidates from a pool for positions within their work unit, or a person who drafts the written rationale for the case of a non-advertised (non-competitive) appointment.

Incumbent-based promotion

A promotion based on an employee's track record with identifiable accomplishments such as promotion for scientific researcher.

Political activities

A carrying on of any activity in support of, within or in opposition to a political party; carrying on any activity in support of or in opposition to a candidate; or seeking nomination as or being a candidate in an election before or during the election period.

Pool (of assessed or partially assessed individuals)

A group of candidates for future consideration who have been assessed on at least one of the merit criteria common to a number of positions. Individuals in the pool may subsequently undergo additional assessment on the remaining merit criteria as positions become available to be filled.

Reclassification

A change in either the occupational group or level of the position (or both) as a result of a classification decision. This can happen on an individual basis, or for multiple employees belonging to the same group and level.

Specific Training

In some instances, employees enter a training program, as part of their employment, with the understanding that they will be promoted to a higher position when the training is successfully completed.

Work Unit

A group of people who have the same objective or who work on the same project and come into regular contact, or meet regularly, with each other.

5.0 Survey Methodology

The Survey of Staffing - Candidates (SOS) was administered from January 26th to February 26th, 2010 to a sample of public service employees who worked in federal departments and agencies which fall under the *Public Service Employment Act (PSEA)* and that had at least 350 employees or more on the last day of the reference period (i.e. September 30, 2009). A similar survey was being sent out by the Public Service Commission to a sample of managers involved in staffing processes during the same time period to explore their views and practices with staffing. Each person in the sample was contacted by e-mail and asked to complete an electronic questionnaire available on the Statistics Canada website. People who could not be contacted by e-mail or those who did not have access to the Statistics Canada website (or required an internet browser) were asked to complete a paper questionnaire.

5.1 Population Coverage

The SOS targeted public service employees who worked in federal departments and agencies with at least 350 employees or more which fell under the *Public Service Employment Act* as of September 30th, 2009 with the following exceptions:

- non-civilians;
- governor-in-council appointments; and
- minister's exempt staff.

The questions targeted three distinct populations. The first group was made up of all employees who were asked questions on political activities. The second included those employees who participated in at least one staffing process in the last 12 months and who were appointed to a new position as a result of the last staffing process that they participated in. The third group was those employees who participated in at least one staffing process in the last 12 months but who were not appointed to a new position as a result of the last staffing process that they participated in. This group included internal employees only.

The targeted employees for the candidates portion of the survey (i.e. groups 2 and 3 described in the previous paragraph) were defined as all candidates who participated in at least one staffing process in the last 12 months whether the last staffing process that they participated in resulted in an appointment or not. The types of appointments that were of interest for the survey were the appointments to the public service and the promotions as well as a fraction of the lateral movements (for example, lateral movements through staffing processes but not in deployments).

If the respondent withdrew prior to the completion of the in-scope staffing process, they went directly to the section on political activities.

5.2 Participating Departments and Agencies

Department/Agency Name	In-scope Active Population
National Defence	27,513
Human Resources and Skills Development Canada	24,990
Correctional Service Canada	17,572
Canada Border Services Agency	14,436
Public Works and Government Services Canada	13,109
Fisheries and Oceans Canada	11,129
Health Canada	10,485
Royal Canadian Mounted Police	7,247

Department/Agency Name	In-scope Active Population
Agriculture and Agri-Food Canada	7,025
Environment Canada	6,996
Statistics Canada	5,693
Industry Canada	5,585
Transport Canada	5,306
Indian and Northern Affairs Canada	5,135
Foreign Affairs and International Trade Canada	4,882
Department of Justice Canada	4,797
Natural Resources Canada	4,669
Citizenship and Immigration Canada	4,360
Veterans Affairs Canada	4,122
Passport Canada	2,777
Public Health Agency of Canada	2,539
Canadian Heritage	2,297
Treasury Board of Canada Secretariat	2,118
Canadian International Development Agency	1,905
Library and Archives Canada	1,148
Public Safety Canada	1,062
Public Service Commission of Canada	1,017
Canada School of Public Service	976
Privy Council Office	871
Immigration and Refugee Board of Canada	860
Public Prosecution Service of Canada	806
Department of Finance Canada	764
Atlantic Canada Opportunities Agency	749
Canadian Grain Commission	699
Canadian Space Agency	637
Courts Administration Service	615
Office of the Superintendent of Financial Institutions Canada	530
Office of the Chief Electoral Officer	528
Western Economic Diversification Canada	470
Economic Development Agency of Canada for the Regions of Quebec	437
Canadian Radio-television and Telecommunications Commission	424
National Parole Board	368
National Energy Board	341
Total In-scope active population	209,989

5.3 Sample Design

The sampling frame was made up of all in-scope employees that were on the Public Works and Government Services Canada's Incumbent file. Since the contact information (e-mail and postal address) was not available on the Incumbent file, it had to be collected by Statistics Canada from the departments through Article 13 of the *Statistics Act*.

The sampling unit was the employee. In each department, a systematic sample of employees was selected from the sampling frame.

5.4 Sample Size

The required target population depends on the following factors:

- the targeted accuracy for the estimations (targeted coefficient of variation (CV)),
- the response rate,
- the share rate (proportion of respondents who agree to share their data with the Public Service Commission (PSC)),
- the minimum proportion to examine and
- the hit rate (proportion of all in-scope employees who are part of the targeted group – the three targeted groups were defined in Section 5.1).

A conservative approach was used for the calculation of the sample size. The expected hit rate for the smaller group (those who were appointed to a new position during the reference period) was used. An estimate of this hit rate was obtained from the Survey of Staffing – Candidates Cycle 1.

The following parameters were used to calculate the sample size for the SOS:

- target CV – 16.5%
- combined response rate and share rate – Max (40.0%, observed Cycle 1 rate)
- estimated minimum proportion – 15.0%
- hit rate based on the average SOS Cycle 1 hit rate

By using these parameters, the required sample size was 92,717 employees.

6.0 Data Collection

6.1 Questionnaire Design

In the spring of 2007, English and French focus groups that included employees from different departments at various groups and levels were held across the country. In November and December of 2007, a pilot version of this survey was conducted in a few departments. The results of the pilot survey were used to improve numerous aspects of the survey.

The electronic format of the questionnaire was designed to follow standard practices and wording, when applicable, in an Internet-based environment. This included the automatic control of question wording and flows that depended upon answers to earlier questions and the use of on-line edits to check for logical inconsistencies and capture errors, such as out-of-range values. The electronic application for data collection was subjected to extensive testing.

Initially the main topic of the survey was staffing processes, for a targeted group of respondents. Later in the development stage, questions on political activities were added and everyone who received the questionnaire was required to answer.

The content for Cycle 2 is the same as Cycle 1 with the exception that the survey covers all types of staffing processes instead of being limited to a few specific types.

6.2 Data Collection

Responding to this survey was voluntary. Data were collected directly from survey respondents.

In October 2009, as part of the communication plan, two official letters announcing the initiative were sent by the Public Service Commission to the participating departments; one communiqué to the Deputy Ministers and another communiqué to the Heads of Human Resources.

From January 26th to 29th, 2010, each person in the sample was contacted by e-mail and invited to complete an electronic questionnaire available on the Statistics Canada website. Those who could not be contacted by e-mail or who did not have access to the Statistics Canada website (or required an internet browser) were invited to complete a paper questionnaire.

Each respondent received an e-mail containing the invitation with a link to the Statistics Canada Electronic Portal. The link had an embedded access code that provided access to the Survey of Staffing – Candidates, Cycle 2 questionnaire.

Paper questionnaires were sent out by regular mail. Once completed, the questionnaire was returned directly to Statistics Canada in a postage-paid return envelope. Statistics Canada accepted completed questionnaires until March 5th, 2010.

During collection four reminder e-mails were sent to participants in the electronic collection who had not already submitted their electronic questionnaire

Participants of the survey received support during the collection period through the Statistics Canada Help Desk (1-800 and e-mail).

7.0 Data Processing

The main outputs of the Survey of Staffing – Candidates (SOS) are “clean” Master and Share files. The Master File consists of data processed from the electronic and paper modes of the questionnaire. The Share File contains a subset of the records from the Master File. Respondents who refused to share their information with the sponsor of the survey, the Public Service Commission (PSC) were removed from the share file. This section presents a brief summary of the processing steps involved in producing these files.

7.1 Data Capture

Since the number of paper questionnaires received was so small the questionnaires were captured directly into the Statistics Canada Electronic Portal.

For the electronic questionnaire, responses to survey questions were entered directly by the respondents. The electronic questionnaire reduces processing time and costs associated with data entry, transcription errors and data transmission. The responses were secure through industry standard encryption protocols, firewalls and encryption layers.

Some editing was done directly at the time the electronic questionnaire was completed. Where the information was outside the range (too large or small) of expected values, or inconsistent with the previous entries, the respondent was prompted, through message screens, to verify the information. However, the respondents had the option of bypassing the edits, and of skipping questions if they did not know the answer or refused to answer. Therefore, the data were subjected to further edit processes after they were submitted. When the electronic data was received it was converted to readable text files.

7.2 Verification and Editing

Electronic text files containing the daily transmissions of submitted cases coming from the Statistics Canada website collection were combined to create the “raw” survey files. Before further processing was done, verification was performed to identify and eliminate potential duplicate records and to identify non-response and out-of-scope records.

To be considered a response record, respondents must have completed three specific questions about the position they applied for or were appointed to and/or answered two specific questions within the political activity section. If these response criteria were not met, the record was considered as a non-response.

The first type of error treated involved a lack of information in questions that should have been answered. For this type of error, a non-response or “not-stated” code was assigned to the item.

The second type of error treated was errors in questionnaire flow, where questions that did not apply to the respondent (and should therefore not have been answered) were found to contain answers. In this case a computer edit automatically eliminated superfluous data by following the flow of the questionnaire implied by answers to previous, and in some cases, subsequent questions.

As well, data inconsistencies were corrected. Some verification was done to check if the respondent’s age group was compatible with the number of years they worked in the Public Service, and by the date they started working in their general work unit before the staffing process concluded. Occupational levels within specific occupation groups were also verified as to their validity, either by the position the respondent applied for, or by the position the respondent held before the staffing process concluded.

7.3 Coding of Open-ended Questions

There were no open-ended questions in the SOS.

7.4 Imputation

There was no imputation in the SOS. Item and partial non-response were coded as “Not stated” during the editing process.

7.5 Creation of Derived Variables

A number of variables included on the Master file have been derived by combining variables on the questionnaire in order to facilitate data analysis. The following is a list of the derived variables for the SOS.

MOVEMENT	Was this position that the employee applied for or was appointed to, a lateral movement, a promotion or other?
CHNGREG	Did the employee apply to or get appointed to, a position in the same region where they were already working/living?
EXTNAOS	Could the employee have come in from the general public by way of a process for persons that were permitted to apply from anywhere in Canada and/or Canadian citizens living outside of Canada?
UNDERREP	Was the employee a member of any of three employment equity groups?
FAIRASSM	Taken together, how fairly were all the factors being considered assessed?
VALIDFLG	PSC flag indicating responses considered as valid

7.6 Weighting

The principle behind estimation in a probability sample survey such as the SOS is that each employee in the sample “represents”, besides himself or herself, several other employees not in the sample. For example, in a simple random 2% sample of the population, each person in the sample represents 50 persons in the population.

The weighting phase is a step which calculates, for each record, what this number is. This weight appears on the microdata file, and must be used to derive meaningful estimates from the survey. For example if the number of employees who worked in Quebec and participated in a staffing process in the last 12 months is to be estimated, it is done by selecting the records referring to those employees in the sample with these characteristics and summing the weights entered on those records.

Details of the method used to calculate these weights are presented in Chapter 10.0.

7.7 *Suppression of Confidential Information*

It should be noted that the “Share” file differs from the survey “Master” file held by Statistics Canada. The Share File contains a subset of the records from the Master File. Respondents who refused to share their information with the sponsor of the survey, the Public Service Commission were removed from the share file. The overall share rate for Cycle 2 of the SOS was 89.1%.

Users requiring access to information excluded from the “Master” microdata file may purchase custom tabulations. Estimates generated will be released to the user, subject to meeting the guidelines for analysis and release outlined in Chapter 9.0 of this document.

8.0 Data Quality

8.1 Response Rates – Departments and Agencies

The following table summarizes the response rates for the Survey of Staffing – Candidates (SOS) Cycle 2.

Response Rates by Department/Agency – Unweighted

Department/Agency Name	Sample Size	Responding Employees		Response Rate (%)	
		Master	Share	Master	Share
National Defence	3,778	1,712	1,540	45.3	40.8
Human Resources and Skills Development Canada	3,343	1,765	1,538	52.8	46.0
Correctional Service Canada	3,760	1,351	1,173	35.9	31.2
Canada Border Services Agency	3,749	2,113	1,822	56.4	48.6
Public Works and Government Services Canada	3,749	1,714	1,524	45.7	40.7
Fisheries and Oceans Canada	4,981	1,838	1,666	36.9	33.4
Health Canada	3,600	1,502	1,330	41.7	36.9
Royal Canadian Mounted Police	3,696	1,714	1,558	46.4	42.2
Agriculture and Agri-Food Canada	3,697	1,491	1,330	40.3	36.0
Environment Canada	3,559	1,477	1,343	41.5	37.7
Statistics Canada	2,371	1,639	1,473	69.1	62.1
Industry Canada	3,459	1,613	1,417	46.6	41.0
Transport Canada	3,292	1,590	1,429	48.3	43.4
Indian and Northern Affairs Canada	3,657	1,642	1,484	44.9	40.6
Foreign Affairs and International Trade Canada	3,580	1,642	1,454	45.9	40.6
Department of Justice Canada	3,643	1,627	1,437	44.7	39.4
Natural Resources Canada	3,550	1,408	1,275	39.7	35.9
Citizenship and Immigration Canada	3,409	1,880	1,677	55.1	49.2
Veterans Affairs Canada	2,906	1,437	1,303	49.4	44.8
Passport Canada	2,777	1,124	955	40.5	34.4
Public Health Agency of Canada	2,539	826	726	32.5	28.6
Canadian Heritage	2,297	944	850	41.1	37.0
Treasury Board of Canada Secretariat	2,118	956	862	45.1	40.7
Canadian International Development Agency	1,905	687	611	36.1	32.1
Library and Archives Canada	1,148	494	442	43.0	38.5
Public Safety Canada	1,062	467	435	44.0	41.0
Public Service Commission of Canada	1,017	462	414	45.4	40.7
Canada School of Public Service	976	424	373	43.4	38.2
Privy Council Office	871	266	241	30.5	27.7
Immigration and Refugee Board of Canada	860	379	334	44.1	38.8
Public Prosecution Service of Canada	806	343	300	42.6	37.2

Department/Agency Name	Sample Size	Responding Employees		Response Rate (%)	
		Master	Share	Master	Share
Department of Finance Canada	764	333	300	43.6	39.3
Atlantic Canada Opportunities Agency	749	389	356	51.9	47.5
Canadian Grain Commission	699	358	317	51.2	45.4
Canadian Space Agency	637	331	310	52.0	48.7
Courts Administration Service	615	237	195	38.5	31.7
Office of the Superintendent of Financial Institutions Canada	530	235	203	44.3	38.3
Office of the Chief Electoral Officer	528	250	224	47.3	42.4
Western Economic Diversification Canada	470	228	207	48.5	44.0
Economic Development Agency of Canada for the Regions of Quebec	437	195	181	44.6	41.4
Canadian Radio-television and Telecommunications Commission	424	204	170	48.1	40.1
National Parole Board	368	156	140	42.4	38.0
National Energy Board	341	156	136	45.7	39.9
Survey of Staffing - Candidates Response Rate	92,717	41,599	37,055	44.9	40.0

8.2 Survey Errors

The estimates derived from this survey are based on a sample of employees. Somewhat different estimates might have been obtained if a complete census had been taken using the same questionnaire, collection methods, processing methods, etc. as those actually used in the survey. The difference between the estimates obtained from the sample and those resulting from a complete count taken under similar conditions, is called the sampling error of the estimate.

Errors which are not related to sampling may occur at almost every phase of a survey operation. Respondents may misunderstand instructions, make errors in answering questions, the answers may be incorrectly entered on the questionnaire and errors may be introduced in the processing and tabulation of the data. These are all examples of non-sampling errors.

Over a large number of observations, randomly occurring errors will have little effect on estimates derived from the survey. However, errors occurring systematically will contribute to biases in the survey estimates. Considerable time and effort were taken to reduce non-sampling errors in the survey. Quality assurance measures were implemented at each step of the questionnaire development, data collection and processing cycle to monitor the quality of the data. These measures include focus group testing to detect problems of questionnaire design or misunderstanding of instructions, the use of highly tested computerized questionnaire applications, procedures to ensure that data capture errors were minimized, and edit quality checks to verify the processing logic.

8.2.1 The Frame

The sampling frame was made up of all in-scope employees from the Public Works and Government Services Canada's Incumbent file. Since the e-mail address for each employee was not available from the Incumbent file, it had to be collected by Statistics

Canada from the departments through Article 13 of the *Statistics Act*. The files received from the departments were linked to the Public Works and Government Services Canada's Incumbent file to create the survey frame.

The record linkage was done using the variable "PRI (personal record identifier)". When the variable was not available, the record linkage was done using the variables "Department", "Last name", "First name initial", "Province of work", "Sex", "Position occupational group and level", "Employee occupational group and level" and "Department start date" when provided by the departments. The average link rate was 93%, which resulted in only 7% of the sampled employees with no contact information.

8.2.2 Data Collection

A description of the objectives of the survey was provided to the respondents, as well as a glossary of terms. A set of questions and answers was also provided on the "Information for Survey Participants", on the Statistics Canada Internet site.

The Statistics Canada Help Desk (1-800 and e-mail) provided support for participants who had questions during collection or needed technical assistance.

The survey was conducted from January 26th to February 26th, 2010.

8.2.3 Data Processing

Data processing of the SOS was done in a number of steps including verification, editing, estimation, confidentiality, etc. At each step a copy of the output files is kept and an easy verification can be made comparing files at the current and previous step. This greatly improved the data processing stage.

8.2.4 Non-response

A major source of non-sampling errors in surveys is the effect of non-response on the survey results. The extent of non-response varies from partial non-response (failure to answer just one or some questions) to total non-response. Total non-response occurred because employee contact information from the department was not obtained, the contact information was incorrect, the respondent had problems accessing the electronic questionnaire, or the respondent refused to participate in the survey. Total non-response was handled by adjusting the weight of employees who responded to the survey to compensate for those who did not respond.

In most cases, item non-response to the survey occurred when the respondent did not understand or misinterpreted a question, refused to answer a question, or could not recall the requested information. For item non-response a "Not stated" code was assigned to the item.

During the electronic collection, partial non-response occurred when the respondent saved the questionnaire but did not submit it for various reasons. In the case of the SOS, only 0.8% of respondents saved the questionnaire but did not submit it. The missed questions were treated as multiple item non-response and coded to "Not stated".

8.2.5 Measurement of Sampling Error

Since it is an unavoidable fact that estimates from a sample survey are subject to sampling error, sound statistical practice calls for researchers to provide users with some indication of the magnitude of this sampling error. This section of the documentation outlines the measures of sampling error which Statistics Canada commonly uses and which it urges users producing estimates from this microdata file to use also.

The basis for measuring the potential size of sampling errors is the standard error of the estimates derived from survey results.

However, because of the large variety of estimates that can be produced from a survey, the standard error of an estimate is usually expressed relative to the estimate to which it pertains. This resulting measure, known as the coefficient of variation (CV) of an estimate, is obtained by dividing the standard error of the estimate by the estimate itself and is expressed as a percentage of the estimate.

For example, suppose that, based upon the 2009 Cycle 1 survey results, one estimates that 52% of federal public servants participated in a staffing activity between October 1, 2007 and September 30, 2008 and this estimate is found to have a standard error of 0.005. Then the coefficient of variation of the estimate is calculated as:

$$\left(\frac{0.005}{0.52} \right) \times 100 \% = 0.96 \%$$

Determining the quality of the estimates and calculating coefficients of variation (CV) for the SOS requires the use of StatMx (Statistical Macro Extensions). StatMx is a collection of SAS macros designed to run under SAS 8 and SAS 9 to produce one or more sets of domain estimates and associated design-based variances (standard errors and CVs). The StatMx suite of SAS macros supports a wide range of sample designs and contains more flexibility and some improved methodology for variance calculations.

9.0 Guidelines for Tabulation, Analysis and Release

This chapter of the documentation outlines the guidelines to be adhered to by users tabulating, analyzing, publishing or otherwise releasing any data derived from the survey microdata files. With the aid of these guidelines, users of microdata should be able to produce the same figures as those produced by Statistics Canada and, at the same time, will be able to develop currently unpublished figures in a manner consistent with these established guidelines.

9.1 Rounding Guidelines

In order that estimates for publication or other release derived from these microdata files correspond to those produced by Statistics Canada, users are urged to adhere to the following guidelines regarding the rounding of such estimates:

- a) Estimates in the main body of a statistical table are to be rounded to the nearest hundred units using the normal rounding technique. In normal rounding, if the first or only digit to be dropped is 0 to 4, the last digit to be retained is not changed. If the first or only digit to be dropped is 5 to 9, the last digit to be retained is raised by one. For example, in normal rounding to the nearest 100, if the last two digits are between 00 and 49, they are changed to 00 and the preceding digit (the hundreds digit) is left unchanged. If the last digits are between 50 and 99 they are changed to 00 and the preceding digit is incremented by 1.
- b) Marginal sub-totals and totals in statistical tables are to be derived from their corresponding unrounded components and then are to be rounded themselves to the nearest 100 units using normal rounding.
- c) Averages, rates and percentages are to be computed from unrounded components (i.e. numerators and/or denominators) and then are to be rounded themselves to one decimal using normal rounding. In normal rounding to a single digit, if the final or only digit to be dropped is 0 to 4, the last digit to be retained is not changed. If the first or only digit to be dropped is 5 to 9, the last digit to be retained is increased by 1. Proportions and ratios are to be computed from unrounded components and then are to be rounded themselves to three decimals using normal rounding.
- d) Sums and differences of aggregates are to be derived from their corresponding unrounded components and then are to be rounded themselves to the nearest 100 units (or the nearest one decimal). Sums and differences of percentages (or ratios) are to be derived from their corresponding unrounded components and then are to be rounded themselves to the nearest one decimal (or three decimals) using normal rounding.
- e) In instances where, due to technical or other limitations, a rounding technique other than normal rounding is used resulting in estimates to be published or otherwise released which differ from corresponding estimates published by Statistics Canada, users are urged to note the reason for such differences in the publication or release document(s).
- f) Under no circumstances are unrounded estimates to be published or otherwise released by users. Unrounded estimates imply greater precision than actually exists.

9.2 Sample Weighting Guidelines for Tabulation

The sample design used for the Survey of Staffing – Candidates (SOS) Cycle 2 was not self-weighting. When producing simple estimates including the production of ordinary statistical tables, users must apply the proper survey weights.

If proper weights are not used, the estimates derived from the microdata files cannot be considered to be representative of the survey population, and will not correspond to those produced by Statistics Canada.

Users should also note that some software packages may not allow the generation of estimates that exactly match those available from Statistics Canada, because of their treatment of the survey weight field.

9.3 Guidelines for Statistical Analysis

The SOS is based upon a sample design with stratification. In order for survey estimates and analyses to be free from bias, the survey weights must be used.

While many analysis procedures found in statistical packages allow weights to be used, the meaning or definition of the weight in these procedures may differ from that which is appropriate in a sample survey framework, with the result that while in many cases the estimates produced by the packages are correct, the variances that are calculated are poor.

For other analysis techniques (for example linear regression, logistic regression and analysis of variance), a method exists which can make the variances calculated by the standard packages more meaningful, by incorporating the unequal probabilities of selection. The method rescales the weights so that there is an average weight of 1.

For example, suppose that analysis of all male respondents is required. The steps to rescale the weights are as follows:

1. select all respondents from the file who reported G_Q05 = male;
2. calculate the AVERAGE weight for these records by summing the original employee weights from the microdata file for these records and then dividing by the number of employees who reported G_Q05 = male;
3. for each of these respondents, calculate a RESCALED weight equal to the original employee weight divided by the AVERAGE weight;
4. perform the analysis for these respondents using the RESCALED weight.

The calculation of more precise variance estimates requires detailed knowledge of the design of the survey. Such detail cannot be given in this microdata file because of confidentiality. Variances that take the complete sample design into account can be calculated by Statistics Canada on a cost-recovery basis

9.4 Coefficient of Variation Release Guidelines

Before releasing and/or publishing any estimates from the SOS, users should first determine the quality level of the estimate. The quality levels are *acceptable*, *marginal* and *unacceptable*. Data quality is affected by both sampling and non-sampling errors as discussed in Chapter 8.0. However for this purpose, the quality level of an estimate will be determined only on the basis of sampling error as reflected by the coefficient of variation as shown below. Nonetheless users should be sure to read Chapter 8.0 to be more fully aware of the quality characteristics of these data.

First, the number of respondents who contribute to the calculation of the estimate should be determined. If this number is less than 10, the weighted estimate should be considered to be of unacceptable quality.

For weighted estimates based on sample sizes of 10 or more, users should determine the coefficient of variation of the estimate and follow the guidelines below. These quality level guidelines should be applied to rounded weighted estimates.

All estimates can be considered releasable. However, those of marginal or unacceptable quality level must be accompanied by a warning to caution subsequent users.

Quality level guidelines

Category 1 - Acceptable

The estimates have low coefficients of variation in the range of 0.0% to 16.5%. No release restrictions: data are of sufficient accuracy that no special warnings to users or other restrictions are required.

Category 2 - Marginal

The estimates have high coefficients of variation in the range of 16.6% to 33.3%. Release with caveats: data are potentially useful for some purposes but should be accompanied by a warning to users regarding their accuracy.

Estimates should be flagged with the letter E (or some similar identifier).

Category 3 - Unacceptable

The estimates have very high coefficients of variation in excess of 33.3%. Not recommended for release: data contain a level of error that makes them so potentially misleading that they should not be released in most circumstances. If users insist on inclusion of Category 3 data in a non-standard product, even after being advised of their accuracy, the data should be accompanied by a disclaimer. The user should acknowledge the warnings given and undertake not to disseminate, present or report the data, directly or indirectly, without this disclaimer.

Estimates should be flagged with the letter F (or some similar identifier) and the following warning should accompany the estimates:

“Please be warned that these estimates [flagged with the letter F] do not meet Statistics Canada’s quality standards. Conclusions based on these data will be unreliable, and most likely invalid.”

10.0 Weighting

The Survey of Staffing (SOS) is a probability survey. As is the case with any probability survey the sample is selected to represent a reference population at a specific date within the context of the survey as accurately as possible. Each unit in the sample must therefore represent a certain number of units in the population.

SOS weighting strategy overview
1. Initial design weight
2A. Non-response adjustment for the Master File
2B. Non-response / non-sharing adjustment for the Share File
3. Post-stratification adjustment and final weight

10.1 Initial Design Weight

At the time of selection, an initial design weight was assigned to each person, as the inverse of its probability of selection. Since the SOS design is stratified with simple random sampling within strata, the probability of selection of the employee i in stratum h is:

$$\pi_{hi}^{initial} = \frac{n_h}{N_h}$$

where, n_h and N_h denote respectively the sample and population size of stratum h . The initial design weight ($w1_{hi}$) is then given by:

$$w1_{hi} = \frac{N_h}{n_h}$$

10.2 Non-response Adjustment for the Master File

It was observed that non-response did not occur randomly or uniformly within the population since different response rates were obtained for different sub-populations. The use of an appropriate technique is required to correct non-response bias that may be introduced. The chosen technique for the Survey of Staffing was based on response homogeneous groups (RHG). RHGs were developed with the premise of identifying sample units with similar response probabilities. In other words, it is assumed that persons pertaining to a given RHG are equally likely to respond to the survey in a similar fashion. Many factors, among them gender and age are traditionally known to be factors associated with different non-response patterns. Analyses were completed and the RHGs were identified. The implementation, i.e. the calculation of the weight adjustment, was carried out using Statistics Canada's StatMx software. This approach also ensures the use of the proper variance formula.

For employee i in RHG j the response probability is calculated as:

$$\pi_{ij}^{response} = \frac{\text{number of responding units}}{\text{number of sample units}}$$

and the non-response adjustment factor is given by the inverse of the response probability. To obtain the weight for person i after the non-response adjustment, we multiply $w1_{hi}$ by the non-response adjustment factor:

$$w2A_{hij} = w1_{hi} \times (\pi_{ij}^{response})^{-1}$$

10.3 Non-response / Non-sharing adjustment for the Share File

People who refused to share their data cannot be included in the share file. Therefore, for the Share file, an adjustment has to be made to the weights of the employees who agreed to share their data in order to compensate for the employees who refused to share. Since the share rate was very high, the non-sharing and the non-response adjustments were performed simultaneously, for the Share File, using Statistics Canada's StatMx software. The process used was similar to the non-response adjustment procedure described in Section 10.2.

For employee i in Response / Sharing Homogeneous Group j the response / sharing probability is calculated as:

$$\pi_{ij}^{response / share} = \frac{\text{number of responding employees who agreed to share their data}}{\text{number of sampled employees}}$$

and the non-response / non-sharing adjustment factor is given by the inverse of the response / sharing probability. To obtain the weight for person i after the non-response / non-sharing adjustment, we multiply $w1_{hi}$ by the non-sharing adjustment factor:

$$w2B_{hij} = w1_{hi} \times (\pi_{ij}^{response / share})^{-1}$$

10.4 Post-stratification Adjustment and Final Weight

Post-stratification is one of the calibration estimation techniques widely used in social surveys. It allows benchmarking on new updated population counts. Note that the post-stratification file still represents the target population. The post-stratification adjustment is calculated at the post-stratum level (department level) using the following formula:

$$\frac{\text{total number of persons in a given post - stratum}}{\text{estimated total number of persons in a given post - stratum}}$$

The final weight consists of cascading the design weight. The non-response adjustment (or the non-response / non-sharing adjustment in the case of the Share File) and the post-stratification adjustment are used to calculate the final weight.

Master file

$$W_{final} = \text{design weight} * \text{non - response adjustment} * \text{post - stratification adjustment}$$

Share file

$$W_{final} = \text{design weight} * \text{non - response / non - sharing adjustment} * \text{post - stratification adjustment}$$

11.0 Questionnaire

The Survey of Staffing – Candidates (SOS) Cycle 2 questionnaire was used in January and February 2010 to collect information for the survey. The file SOS2010C2_QuestE.pdf contains the English questionnaire.

12.0 Record Layout with Univariate Frequencies

Refer to SOS2010C2_Master_CdBk.pdf for the English record layout with univariate counts for the Master file.

Refer to SOS2010C2_Share_CdBk.pdf for the English record layout with univariate counts for the Share file.